Advancing Energy Technology and Innovation: Enhanced Strategic Collaboration between Federal, Provincial, and Territorial Governments

Energy and Mines Ministers' Conference

St. Andrews by-the-Sea, New Brunswick

August 2017

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Context

The Energy and Mines Ministers' Conference (EMMC) is an annual gathering of federal, provincial and territorial (FPT) ministers responsible for energy and mining portfolios to discuss how to support a responsible and competitive industry that contributes to the sustainable development of local communities and Canada as a whole. At these meetings, ministers discuss shared priorities for collaborative action to advance energy and mining development across the country.

Collaboration on research, development and demonstrations (RD&D) of energy technologies plays a significant role in advancing innovation in Canada's energy sector. FPT governments have a shared interest in collaborating on energy technology innovation to accelerate the transition to a low-carbon economy and to enhance the competitiveness of Canada's energy sector.

The Pan-Canadian Framework on Clean Growth and Climate Change (PCF) further strengthens the shared interest among governments in working together to transition to a sustainable, low-carbon economy. The PCF is a collective plan developed by the Government of Canada and most provinces and territories that outlines the ways in which FPT governments will collaborate to support clean growth and address climate change, including in the area of energy technology and innovation. Building on the Paris Agreement from COP21, the PCF is both a commitment to the world that Canada will do its part on climate change and a plan to meet the needs of Canadians.

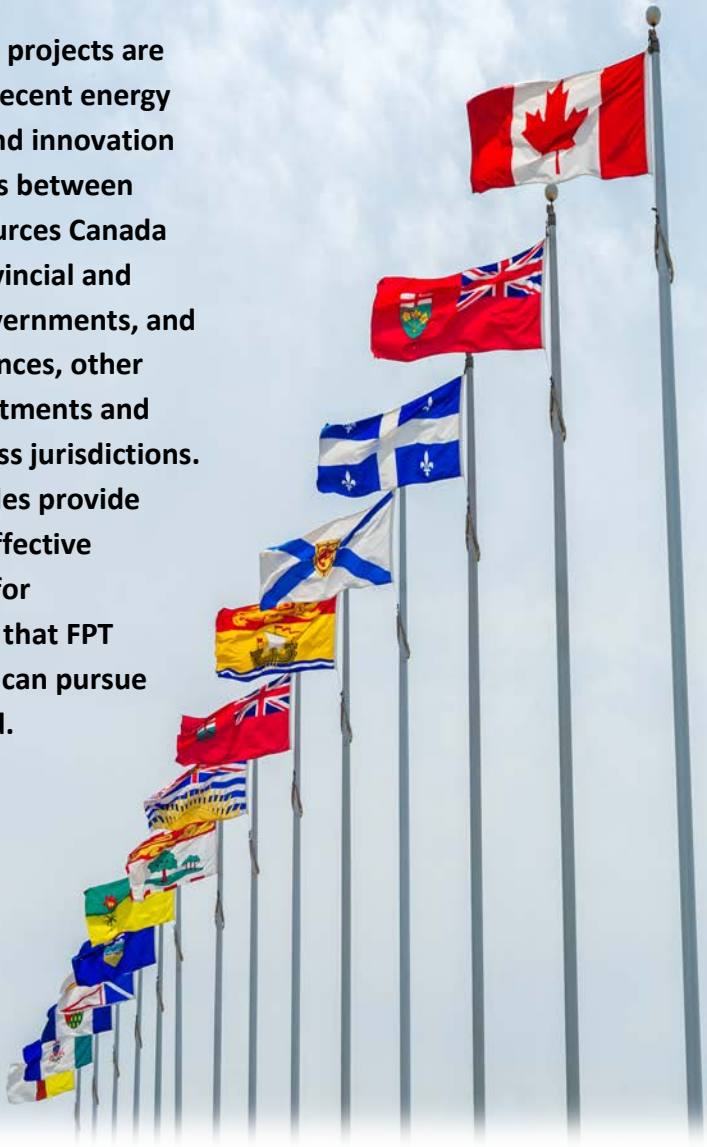
EMMC's Energy Technology Working Group (ETWG) supports the advancement of energy technology and innovation through collaboration on energy technology RD&D. For EMMC 2016, the ETWG developed a report for energy and mining ministers on FPT collaboration, including challenges to collaboration and best practices and lessons learned to advance collaboration among jurisdictions.

Federal, Provincial and Territorial Governments have developed strategic collaboration initiatives on energy technology and innovation inspired by these best practices and lessons learned. Many of these initiatives have been pursued with Federal Budget 2016 funding, which provided notable support for energy technology and innovation.

This report will profile some of the strategic FPT collaborations that have been initiated since EMMC 2016. It is intended to showcase new and innovative forms of collaboration in order to inspire further collaborative activities involving FPT governments and other stakeholders going forward.

Collaborative Initiatives

The following projects are examples of recent energy technology and innovation collaborations between Natural Resources Canada (NRCan), provincial and territorial governments, and in some instances, other federal departments and partners across jurisdictions. These examples provide insight into effective mechanisms for collaboration that FPT governments can pursue going forward.



Environmental Monitoring of Tidal Energy Technology

Project Description

Location: **Halifax, Nova Scotia**

Funding: **$1.5M ($1M from NRCan's Energy Innovation Program)**

This collaboration initiative aims to identify and support research for innovative technologies and approaches that will aid environmental monitoring in the marine environments. More specifically, efforts will focus data collection on assessing the impacts of tidal turbines on the biological and physical environments within the Bay of Fundy.

A joint call is being issued by the Federal and Nova Scotia governments for proposals from Canadian company-led collaborations in the area of environmental monitoring, sensing and imaging technologies to improve environmental effects monitoring of in-stream tidal turbines. By jointly seeking proposals, NRCan, Nova Scotia Department of Energy, and OERA are able to leverage each other's resources, as well as reduce the burden on proponents to apply to separate funds.

The project will be administered by a Project Selection & Management Committee led by OERA and drawn from the contributing partners.

Joint Calls

A form of strategic collaboration between different levels of government and industry partners, joint calls allow partners to leverage each other's resources and expertise to address a common priority by supporting multiple projects.

There are various structures for joint calls that FPT governments can pursue. For this project, the scope of the call was mutually agreed upon by contributing partners, and funding and authority to decide on projects was transferred to OERA.

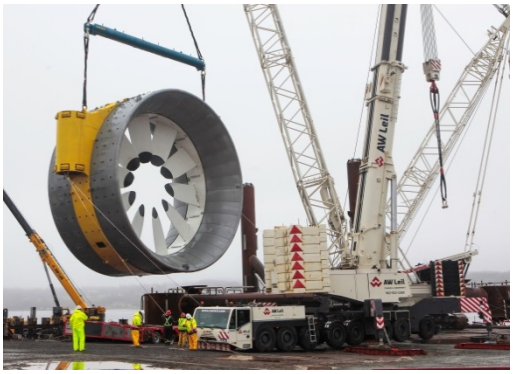
Partners

Natural Resources Canada; Nova Scotia Department of Energy; Offshore Energy Association of Nova Scotia (OERA)

This project is also supported by the British Columbia Department of Energy, which is also interested in developing tidal and wave energy technology. The B.C. Ministry of Energy and Mines Memorandum of Understanding with Nova Scotia is intended to support research and technology development and lead to a clear regulatory and permitting pathway for new projects.

Anticipated Results

The overarching research objective is to reduce uncertainty and investment risk, lower the cost of tidal electricity, and support the responsible development of marine resources. This initiative will solicit research responses to a number of fundamental knowledge and technology gaps and address critical issues common to different tidal energy conversion technologies.



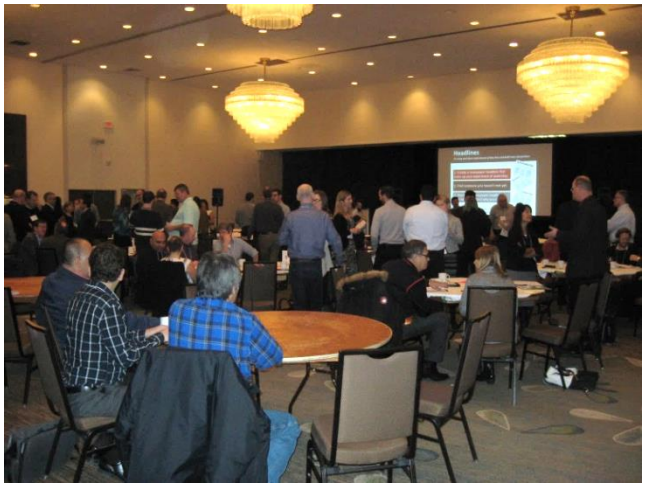
Pan-Canadian Summit on Reducing Diesel Use in Remote Communities

Project Description

Location: Winnipeg, Manitoba

In 2016, the federal government was invited to participate in select areas of the provincially led Canadian Energy Strategy, one of which is exploring ways to reduce diesel use in remote communities. In fall 2016, the federal government worked with the CES Task Force to reduce diesel use in remote communities to plan and organize a Pan-Canadian Summit in Winnipeg, Manitoba (January 16–18, 2017). The Summit was a joint effort between the 10 Provinces and Territories that participate on the CES Remote Communities Task Force, as well as the federal government. NRCan and the Provinces and Territories funded the Summit, and all parties involved contributed to the organization of the event.

The Summit provided a forum for over 150 stakeholders from all levels of government, Indigenous communities, industry, utilities, and academia to discuss and share ideas on how governments can remove barriers and promote diesel-reduction in remote communities. Presentations and posters on clean energy development and lessons learned in remote communities across Canada were shared at the Summit.



Partners

Natural Resources Canada; Indigenous and Northern Affairs Canada; Government of British Columbia; Government of Alberta; Government of Saskatchewan; Government of Manitoba; Government of Ontario; Government of Quebec; Government of Newfoundland and Labrador; Government of Yukon; Government of Northwest Territories; Government of Nunavut

Anticipated Results

The ultimate objective of the Summit is to advance the reduction of diesel use in northern and remote communities through a variety of measures, including demonstrating and deploying low-carbon and renewable energy alternatives. Going forward, there will be many opportunities for FPT collaboration on energy technology and innovation to support remote communities.

A Summit report, which includes recommendations on ways to support the reduction of diesel use in remote communities, will be tabled with Premiers at the Council of the Federation in July 2017.

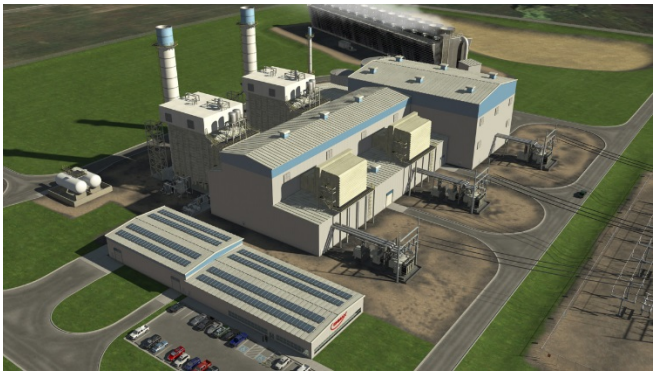
Alberta Carbon Conversion Technology Centre

Project Description

Location: Calgary, Alberta

Funding: $22M total (up to $10M from NRCan's Energy Innovation Program; up to $10M from the Government of Alberta)

The Alberta Carbon Conversion Technology Centre is a collaborative demonstration project between NRCan and the Government of Alberta, co-funded by NRCan's Energy Innovation Program and InnoTech Alberta. The centre will test and refine innovative CO_2 capture and utilization technologies at a near commercial-scale using flue gas from natural gas combustion – a capability that does not currently exist in North America.



Operated by InnoTech Alberta, this facility will be able to test technologies utilizing between 1 and 25 tonnes of CO_2 per day and will include five separate testing bays for concurrent testing of technologies. This centre will accelerate the development of greenhouse gas (GHG) reduction technologies relevant to Canadian industrial sources, and will facilitate industrial adoption by validating commercially viable technologies converting CO_2 feedstock into valuable products.

Co-funding

Co-funding is another form of strategic collaboration between different levels of government and industry where resources are combined on a specific project of mutual interest, such as de-risking and enabling the creation of a technology cluster in an area of Canadian advantage.

Partners

Natural Resources Canada; InnoTech Alberta; Ministry of Economic Development and Trade, Government of Alberta; Canada's Oil Sands Innovation Alliance (COSIA) participants (ConocoPhillips Canada; Canadian Natural Resources Limited; Nexen Energy ULC; Cenovus Energy Inc.; Devon Canada; Suncor Energy; Shell); Shepard Energy Centre (ENMAX Corporation and Capital Power)

Anticipated Results

The development of this Centre enables the creation of a technology cluster focused on carbon capture and utilization, attracting technologies from around the world to test in the facility, and encouraging companies working in this field to re-locate near the facility.

It is expected that this Centre will advance technologies from demonstration through to commercial deployment, ultimately:

- Reducing the costs of managing CO_2 and CO_2 emissions;
- Connecting local expertise with technology companies and industrial customers;
- Demonstrating Canada's global leadership in CO_2 management;
- Developing potential global carbon capture and conversion technology export opportunities for Canadian businesses; and
- Generating local jobs.

Demonstration of New Generation Integrated Smart Infrastructures for Charging Electric Vehicles

Project Description	Partners
Location: Various locations across Canada **Funding: $16.9M total ($6.7M from NRCan's Energy Innovation Program)**	Natural Resources Canada; AddÉnergie Technologies Inc.; Government of Quebec (Ministère de l'Économie, de la Science et de l'Innovation); NB Power; NS Power; PowerStream; Hydro-Québec; Hydro-Joliette; Centre de Gestion de l'équipement roulant du Québec; FleetCarma

This demonstration project is a collaboration between NRCan, the Government of Quebec and several partners. NRCan, through the Energy Innovation Program, contributed $6.7M to the co-funded project, which also received financial support from AddÉnergie, the lead project proponent, Ministère de l'Économie, de la Science et de l'Innovation, and other private partners.

The objective is to develop advanced technologies, business models and enhanced electric vehicle recharging stations across Canada.

There are several components planned under this project, including:

- The development of the next generation of electric vehicle fast charging stations, which will be adapted to the increase of electric vehicles offered to consumers over the next 5 years.
- The development of a new business model that allows Canadians and businesses access to charging services on the basis of a monthly subscription without the need to invest in charging infrastructure.
- The implementation of charging stations designed for street-side installation in 5 major Canadian cities.

Anticipated Results

The project will develop technologies to work towards the commercialization of charging infrastructure for electric transportation vehicles in Canada.

This would ultimately lead to economic and social benefits for Canadians by lowering GHG emissions, creating jobs, developing new expertise, and developing an internationally marketable technology.

Sustainable Development Approach to Improving Energy Security

Project Description

Location: Nunatsiavut, Newfoundland and Labrador

In January 2017, the Nunatsiavut Government released its Energy Security Plan that outlines a proactive and sustainable development approach to meeting the energy and security needs of Labrador's five Inuit communities. The Plan and associated Implementation Strategy place high value on Inuit involvement in energy planning.

The Plan relies on the existing regulatory and policy structures that govern energy planning in the province. The Government of Newfoundland and Labrador (GNL) recognizes that successful and sustainable energy policy requires the Nunatsiavut Government's partnership in energy and planning processes. Consequently, the GNL has been working with several partners, including NRCan and Indigenous and Northern Affairs Canada (INAC), to identify options to support the Nunatsiavut Government. To support these efforts, NRCan and INAC participate as members of the Nunatsiavut Energy Security Working Group.

Collaboration can have a direct impact on achieving the objectives outlined in the Plan, including:

- Projecting the short- and medium-term energy demand trends and requirements in Nunatsiavut;
- Documenting the impacts of diesel power reliance and supply constraints;
- Identifying options for energy demand reductions, enhanced productivity of diesel systems and energy distribution systems, renewable energy, etc. over the short- and medium-terms; and
- Researching and discussions between government and partner organizations and securing adequate capital and capacity for implementation.

Partners

Government of Newfoundland and Labrador; Nunatsiavut Government; Natural Resources Canada; Indigenous and Northern Affairs Canada; NL Hydro

Anticipated Results

The Nunatsiavut Government's Energy Security Plan outlines that "through collaboration between communities, governments and energy agencies, a set of policy, planning and energy system innovations can be created to provide a more sustainable energy future for northern communities. This will require long-term planning, community infrastructure and energy system investment, local coordination and capacity-building, and implementation management."

The GNL will work in collaboration with the Government of Canada and the Nunatsiavut Government to achieve these outcomes.

Federal Budget 2016 and 2017 initiatives to which proponents could apply in support of the Plan (subject to a merit-based selection process):

- Northern REACHE Program: $10.7M over two years to implement renewable energy projects in off-grid Indigenous and northern communities.
- Climate Change Preparedness in the North Program: $21.78M over five years to support Indigenous and northern communities in the North to plan for adapting to climate change impacts.
- Green Infrastructure: $220M to reduce diesel use in rural and remote communities.

Novel Hot Solvent Extraction Process

Project Description

Location: Foster Creek Project, Alberta

Funding: $23.2M total ($7.5M from NRCan's Energy Innovation Program)

This hot solvent technology demonstration at the Foster Creek project in Alberta is an initiative by Cenovus FCCL that is supported by co-funding from NRCan, through the Energy Innovation Program, and Alberta Innovates, a publicly funded corporation. The Energy Innovation Program will contribute $7.5M to the overall $23.2M project costs, with a substantial contribution coming from Alberta Innovates.

The project will demonstrate an enhanced bitumen recovery process involving the co-injection of steam and solvent in an in situ steam-assisted gravity drainage (SAGD) production. It will test the efficiency of the steam and solvent co-injection in terms of the amount of oil recovered, the water and steam requirements, and its impact on the cumulative steam-to-oil ratio during bitumen production, and on water treatment costs associated with steam generation.

Partners

Natural Resources Canada; Cenovus FCCL Ltd.; Alberta Innovates; ConocoPhillips Canada

Anticipated Results

Ultimately, this project aims to demonstrate a way to increase market competitiveness and environmental performance by more efficiently producing bitumen and lowering energy costs, while lowering water use and greenhouse gas emissions (GHG) in the Canadian oil sands industry.

If the demonstration project is successful and later deployed, the steam to oil ratio and the related GHG emission intensity of existing in situ oil sands operations could be reduced significantly, reducing GHG emissions and making new in situ projects more economical because of lower capital requirements associated with reduction in water treatment and steam generation costs.

International Collaboration through Mission Innovation

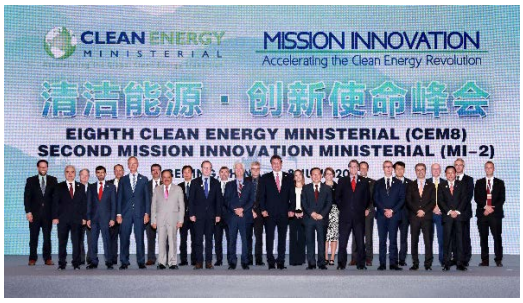
Project Description	Partners
Location: Various locations across Canada At EMMC 2016, Ministers committed to exploring mechanisms and opportunities for Provinces and Territories to collaborate in international fora, including Mission Innovation (MI). In November 2016, on the margins of COP22, MI member countries launched seven "Innovation Challenges": 1. Smart Grids Innovation Challenge 2. Off Grid Access to Electricity Innovation Challenge 3. Carbon Capture Innovation Challenge 4. Sustainable Biofuels Innovation Challenge 5. Converting Sunlight Innovation Challenge 6. Clean Energy Materials Innovation Challenge 7. Affordable Heating and Cooling of Buildings Innovation Challenge Through the Challenges, MI members aim to encourage increased engagement from the global research community, industry and investors, while also establishing new collaborations between MI members. NRCan, Canada's lead on MI, has engaged with Provinces and Territories through the EMMC Energy Technology Working Group to identify opportunities for involvement in the MI Challenges. This engagement has led to the connection of some Provinces and Territories to the Canadian leads of Challenges, and connections will continue to be established as interest is expressed.	Natural Resources Canada; National Research Council; Various Provincial and Territorial governments

MISSION INNOVATION
Accelerating the Clean Energy Revolution

Anticipated Results

Work plans for each Innovation Challenge were endorsed by Ministers at the MI Ministerial meeting in Beijing in June 2017.

As part of the Ministerial, an Innovation Theatre was held to showcase new and potentially game-changing clean energy innovations and inspirations. Provinces and Territories assisted the federal government in reaching out to Canadian companies in their jurisdictions to ensure they were aware of and determine their interest in participating in this event.



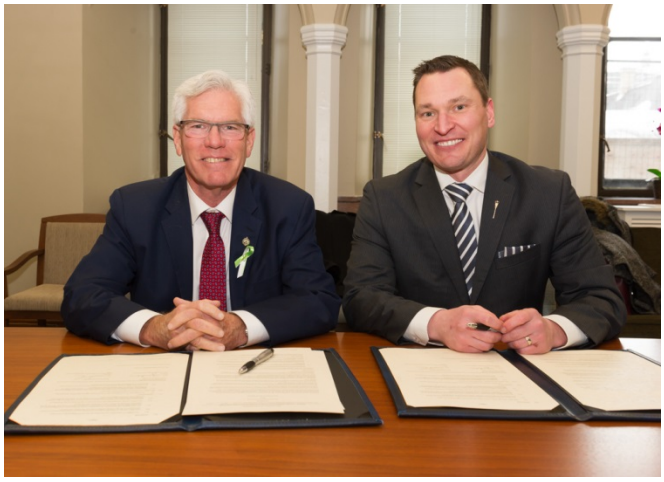
FPT governments working together in international fora, such as MI, will be key to enhancing partnerships and collaboration on international energy issues to open new markets and position Canada as a global energy leader.

Alberta-Canada Collaboratory on Clean Energy Research and Technology

Project Description

Location: Alberta

Signed by NRCan's Minister of Natural Resources, Jim Carr, and Alberta's Economic Development and Trade Minister, Deron Bilous, on February 13, 2017, the Memorandum of Understanding (MOU) between the Government of Canada and the Government of Alberta will enhance FPT collaboration on more sustainable oil sands development and on clean energy technology and research addressing climate change and pollution for a clean growth economy.



This MOU builds on a previous one between the Governments of Canada and Alberta signed in 2012 that supported the development of new and improved oil sands technologies. This new MOU expands the scope to include clean technologies outside of the oil sands sector, focusing on the following 4 areas:

- Cleaner natural resources;
- Bio-industrial;
- Energy efficiency and environmental performance; and,
- Transforming the energy mix.

Partners

Government of Canada (Natural Resources Canada); Government of Alberta

Anticipated Results

It is anticipated that this MOU will:

- Enable strategic planning and funding discussions on clean energy;
- Align collaboratory efforts with Alberta and Canada's energy strategies, innovation, and R&D to support energy and climate change policies and priorities;
- Ensure the full research and technology development capacity of Alberta and NRCan's CanmetENERGY laboratories is harnessed; and
- Strengthen the ability to collaborate on transformative research, scale-up and demonstration projects in targeted areas.

Specifically, in the short term, the MOU will support collaborative funding of up to 4 projects by the Governments of Canada and Alberta. In the long term, the goal is to support the transition of Alberta towards a low carbon, circular economy, and capitalize on opportunities to develop new technology products and services for global opportunities.

NRCan and the Government of Alberta are already working closely together on related projects, including the Carbon Conversion Technology Centre.

Key Observations

As FPT governments work towards the implementation of the Pan-Canadian Framework on Clean Growth and Climate Change, there will be many opportunities for collaboration on energy technology and innovation. Through the PCF, the Government of Canada and most provinces and territories have expressed the importance of collaboration and identified potential areas to work together to enhance energy technology RD&D.

To date, new and innovative mechanisms for collaboration, often supported by funding from Federal Budget 2016, have resulted in enhanced collaboration on energy technology and innovation between the federal government and provinces and territories. Pursuing strategic collaboration initiatives, such as co-funding or joint calls between the federal and provincial/territorial governments, has led to the success of many energy technology RD&D projects across Canada, beyond the initiatives profiled in this report.

Strategic collaboration initiatives are an effective approach to advancing shared interests. For example, collaborations through joint calls and co-funding initiatives allow for FPT governments, as well as industry partners, to leverage each other's resources and expertise to address a common priority either with or without a specific project in mind. Beyond leveraging each other's resources and expertise, there are many benefits to collaborating on energy RD&D projects for both FPT governments and project proponents. Issuing joint calls or co-funding projects ensures alignment among FPT governments in advancing energy RD&D, therefore reducing the likelihood of duplicating efforts. The project review and due diligence stage can also be made more efficient when resources and responsibilities are shared amongst FPT governments. It also improves the process for project proponents, as they may be able to focus their efforts on applying to fewer funding programs and potentially maximize FPT support for a project.

Strategic collaboration between FPT governments is made possible by increased flexibility of funding programs and processes. The timing of federal and provincial or territorial programs is important for determining the availability of funds and the potential for alignment between programs to allow for co-funding of projects. Additionally, to accommodate new mechanisms for collaboration, the Terms and Conditions governing the way in which programs can be designed and implemented have had to be adjusted by FPT governments to allow them to work more closely with each other. Flexibility is critical for ensuring project partners are able to contribute at various stages of a project, such as defining the scope, reviewing and selecting projects, and contributing funding. In order to further develop innovative ways to collaborate, it is important to continue exploring ways to adjust and increase flexibility in these Terms and Conditions.

FPT governments are encouraged to seek opportunities to collaborate on energy technology and innovation. It is important to note that strategic collaborations extend beyond joint calls and co-funding mechanisms, and that any form of strategic collaboration is encouraged. It is hoped that the examples of mechanisms for strategic collaboration in this report will spur interest and lead to increased collaboration initiatives between federal, provincial and territorial governments going forward.

Ongoing implementation of the Pan-Canadian Framework (PCF) on Clean Growth and Climate Change will present many opportunities to establish strategic collaborations. Federal Budget 2017 initiatives will support energy technology and innovation on a number of priorities that were identified as areas of mutual interest for FPT governments in the PCF. It would be beneficial for FPT governments to capitalize on these opportunities to accelerate the advancement of energy technology and innovation.